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Report on Microtox Toxicity Screening Tests on Ottawa River Water and Suspended Sediment Samples Collected Near Lemieux Island, 1985

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ABSTRACT

A total of 56 water samples and three suspended sediment samples from the Ottawa River were collected for Microtox toxicity screening tests. All 56 water samples were tested under 1X and 10X concentrations. Two of the suspended sediment samples contained toxicants while only five of the 10X water samples showed toxic effect. Toxicants were not detected in 1X water samples.

INTRODUCTION

This study was carried out to obtain baseline information on toxicant loading and distribution in the Ottawa River. Also during the course of this study, an attempt was made to evaluate the applicability of the Microtox screening test and water elution procedures to test for toxicants in suspended sediments.

METHODS

Samples

A total of 56 water samples were collected on a weekly basis during the January to December 1985 period. Water samples were collected from a polyethylene multi-intake system which was secured to a stainless steel frame, 50 metres from shore and 1 metre from the river bottom north of Lemieux Island. At each collection time, the system was flushed for a minimum of an hour before microbiological water samples were collected. Water samples were collected in 50 mL sterile polypropylene bottles. In addition to the weekly water samples, centrifuged water and suspended sediment samples were also collected in November and December (Tables 1 and 2). The suspended sediment samples were collected with a Westfalia continuous flow centrifuge model KA-1-06-175 equipped with a four chamber stainless

steel bowl rotating at 9300 rpm. Approximately 8600 litres of river water were centrifuged during the 24 hour period. Centrifuged water samples were collected from the outlet of the centrifuge at the 14th hour of each suspended sediment sampling event. All water samples and suspended sediment samples were iced and shipped back to NWRI Microbiology Laboratories Section by courier. Samples on arrival were processed for toxicity activity by the Microtox toxicity screening procedure within 24 hours of collection.

Toxicity Screening

The Microtox toxicity screening was carried out following the procedure detailed in the Beckman Instruments Inc. (1982) manual, with contact time of 15 minutes (Dutka and Kwan, 1982). All water samples were tested at 1X and 10X concentrations. The 10X water saples were concentrated by using the Büchi Rotavapor model R-110 at 45°C temperature under normal atmospheric pressure.

For each suspended sediment sample, the suspended sediment was removed with a Teflon scraper from each bowl and placed into a sterile beaker. Then 10 gm of the sediment were weighed out and placed into an acid washed and Milli-Q reagent grade water rinsed (5 times) B.O.D. bottle. Ten millilitres of glass distilled water were added to the sediment and the bottle was stoppered and shaken vigorously by hand for two minutes. The mixture was then poured into conical

centrifuge tubes and centrifuged for 20 minutes at 10,000 rpm at 4°C. The supernatant was used for toxicity tests. Data for the water samples and the suspended sediment samples are reported in millilitres and grams required to produce and EC 50 i.e. 50% of light reduction.

RESULTS AND DISCUSSION

Results obtained from the 1985 water and suspended sediment samples (Figure 1) indicated that the Ottawa River at this point is almost free of toxicant contamination as measured by the Microtox toxicity test under test conditions. Table 1 represents the results of the 1X and 10X water samples tested. It can be seen that toxicants were not detected in the 1X water samples. Only five 10X water samples collected on May 7, June 4 and 11, October 22 and 29 were found to contain toxicant activity. The EC 50 values for these samples were very much within the same toxicity levels. They were 0.50 mL (May 7) , 0.43 mL (June 4), 0.33 mL (June 11), 0.50 mL (October 22) and 0.50 mL (October 29). The source of the low toxicant levels detected in the 10X water samples in May 7, June 4 and 11, and October 22 and 29 are not known. It is suspected that these positive findings may be due to the recent and infrequent contamination from either industrial and/or municipal upstream discharges or the failure of the technique.

Table 2 presents the data obtained from the suspended sediment samples collected in November and December months. Toxicants were not detected from the sample collected on December 3. The EC50 values for the suspended sediment samples collected on November 5 and 19 were 0.22 gm and 0.43 gm, respectively.

From the data in Tables 1 and 2, it can be seen that two of the three suspended sediment samples contained toxicants whereas zero and five water samples showed toxic activity in the 1X and 10X water samples, respectively. The data indicate that detectable amounts of toxicants (contaminants) are carried in the suspended sediments. The results of suspended sediment elution and toxicant screening procedures used in this study produced data that confirm McCrea et al. (1985), Kuntz and Warry (1983) and Warry and Chan's (1981) findings that suspended sediments are rich in toxicants.

REFERENCES

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Figure 1 Sampling Site on the Ottawa River near Lemieux Island

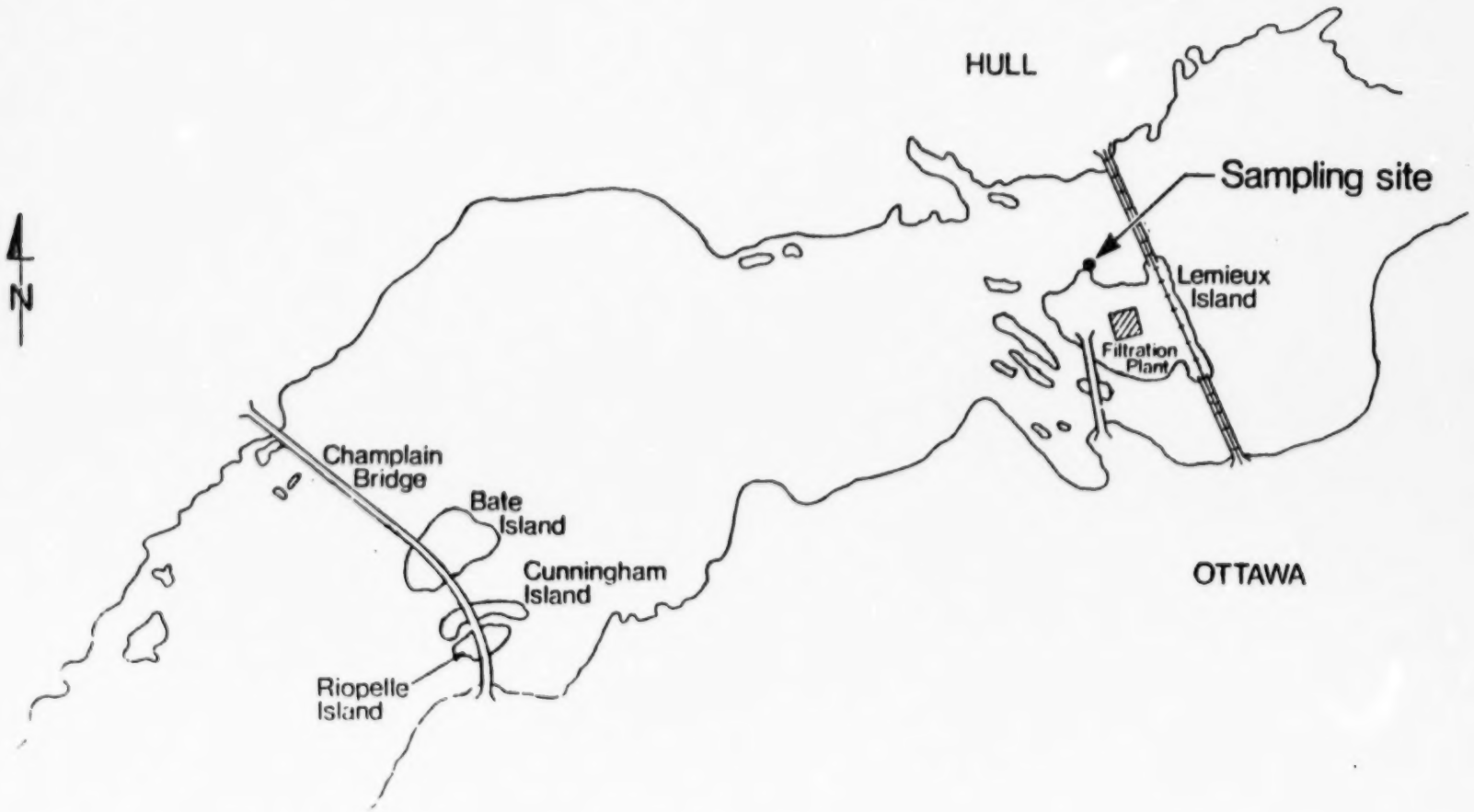

TABLE 1. Microtox EC 50 values of water samples from Ottawa River near Lemieux Island

Sample Date	EC 50 Values in mL	
	1X	10X
Jan 8	N.D.*	N.D.
15	N.D.*	N.D.
22	N.D.*	N.D.
29	N.D.*	N.D.
Feb 5	N.D.*	N.D.
12	N.D.*	N.D.
19	N.D.*	N.D.
26	N.D.*	N.D.
Mar 5	N.D.*	N.D.
12	N.D.*	N.D.
19	N.D.*	N.D.
26	N.D.*	N.D.
Apr 2	N.D.*	N.D.
9	N.D.*	N.D.
16	N.D.*	N.D.
23	N.D.*	N.D.
30	N.D.*	N.D.
May 7	N.D.*	0.50 mL
14	N.D.*	N.D.
21	N.D.*	N.D.
28	N.D.*	N.D.
Jun 4	N.D.*	0.43 mL
11	N.D.*	0.33 mL
25	N.D.*	N.D.
Jul 2	N.D.*	N.D.
9	N.D.*	N.D.
16	N.D.*	N.D.
23	N.D.*	N.D.
30	N.D.*	N.D.
Aug 6	N.D.*	N.D.
13	N.D.*	N.D.
27	N.D.*	N.D.
Sep 3	N.D.*	N.D.
10	N.D.*	N.D.
17	N.D.*	N.D.
24	N.D.*	N.D.
Oct 1	N.D.*	N.D.
8	N.D.*	N.D.
15	N.D.*	N.D.
22	N.D.*	0.50 mL
29	N.D.*	0.50 mL

TABLE 1. Microtox EC 50 values of water samples from Ottawa River near Lemieux Island

continued

Sample Date	EC 50 Values in mL	
	1X	10X
Nov 4	N.D.*	N.D.
** 4	N.D.*	N.D.
5	N.D.*	N.D.
** 5	N.D.*	N.D.
12	N.D.*	N.D.
** 18	N.D.*	N.D.
18	N.D.*	N.D.
** 19	N.D.*	N.D.
19	N.D.*	N.D.
26	N.D.*	N.D.
Dec 2	N.D.*	N.D.
** 2	N.D.*	N.D.
3	N.D.*	N.D.
** 3	N.D.*	N.D.

* Not detected.

** Centrifuged.

TABLE 2. Microtox EC 50 values of suspended sediment samples from Ottawa River near Lemieux Island

Date	EC 50
November 5	0.22 gm
November 19	0.45 gm
December 3	N.D.*

*Not detected.